

***HYLAEUS HYALINATUS* SMITH, A EUROPEAN BEE NEW TO NORTH  
AMERICA, WITH NOTES ON OTHER ADVENTIVE BEES  
(HYMENOPTERA: APOIDEA)**

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*Abstract.*—The common and widespread European bee *Hylaeus* (*Spatulariella*) *hyalinatus* Smith (Hymenoptera: Colletidae) is reported for the first time from the New World. During 1997–2000, specimens were collected in Ithaca, Tompkins County, New York. Diagnostic features are described and photographed to facilitate separation of *H. hyalinatus* from Nearctic *Hylaeus* species and from the two other Palearctic *Hylaeus* species previously reported as adventive in North America. Its geographic distribution, host plants, and seasonal history are summarized from the literature and from collections made in New York. Notes are provided on the occurrence of other adventive bee species including the first records of *Hylaeus* (*Spatulariella*) *punctatus* (Brullé) from northern California and of *Megachile* (*Callomegachile*) *sculpturalis* Smith (Hymenoptera: Megachilidae) from New York state.

*Key Words:* Hymenoptera, Colletidae, Megachilidae, adventive insect, distribution, North America

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*Hylaeus hyalinatus* is the seventeenth species of bee to be reported as adventive in North America (excluding *Apis mellifera* L., four other deliberately introduced species, and *Ceratina* (*Calloceratina*) aff. *laeta* Spinola, which may be adventive in south Texas from the neotropics; Cane, in press). Each of these species is native to the Old World and is thought to have reached North America as a result of accidental anthropogenic movement of nests containing diapausing bees. Although adventive bees comprise less than 0.5% of North American bee species (Cane, in press), they may comprise a larger percentage of local faunas, especially in northeastern North America. In Ithaca, Tompkins County, New York, no less than ten species are established and abundant, and these species comprise 3.2% of the total bee fauna of 310 species, and

4.3% of the 231 pollen-collecting bee species (John Ascher, unpublished data). More adventive bee species occur in Ithaca, New York than have been reported from any other continental locality in the world. The most diverse fauna of exotic bees is likely that of the Hawaiian Islands. The rate of establishment of exotic bee species appears to have increased in recent decades, especially in the northeastern United States. *Anthidium manicatum* (L.), *Chelostoma fuliginosum* (Panzer), and *Chelostoma campanularum* (Kirby), were discovered in central New York in 1963 (Jaycox 1967), 1973 (Eickwort 1980), and 1962 (Eickwort 1980) respectively, while the first North American record of *Hoplitis anthocopoides* came from Albany County, New York, in 1969 (Eickwort 1970). Two additional Palearctic megachilids have recently become estab-

lished and locally abundant in the eastern United States: *Anthidium oblongatum* (Illiger) (Hoebeke and Wheeler 1999) and *Megachile sculpturalis* Smith (Mangum and Brooks 1997, Batra 1998).

RESULTS

*Hylaeus (Spatulariella) hyalinatus* Smith

(Figs. 1, 2)

During an ongoing survey of the bees of Ithaca, Tompkins County, New York, I collected numerous specimens of an unusual hylaeine bee on the Cornell University campus. These proved to be *Hylaeus (Spatulariella) hyalinatus* Smith (Hymenoptera: Colletidae). Although this Palearctic species is previously unrecorded in the New World, another species of *Spatulariella*, *Hylaeus (S.) punctatus* (Brullé), has been reported to be adventive in Los Angeles County, California (Snelling 1983) and Santiago, Chile (Toro et al. 1989). Additional records of *H. punctatus* are provided below.

New York specimens of *H. (S.) hyalinatus hyalinatus* agree with the description and figures in Dathe (1980) and match identified specimens in the Cornell University Insect Collection (CUIC). Identification was confirmed by Roy R. Snelling of the Los Angeles County Museum (LACM). Voucher specimens collected in Ithaca have been placed in the following collections: CUIC, LACM, the American Museum of Natural History (AMNH), the Snow Entomological Museum, University of Kansas (SEM), and the Essig Museum, University of California, Berkeley (UCB).

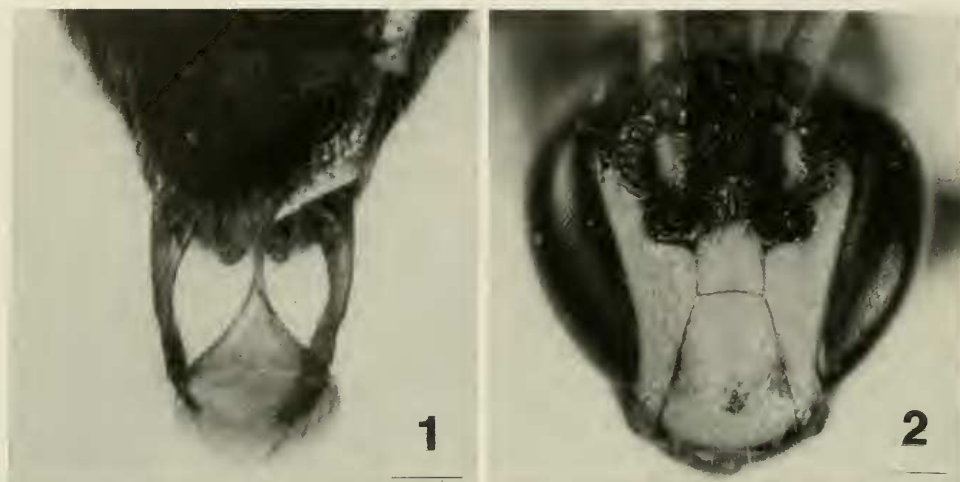
Snelling (1983) modified his key to the Nearctic subgenera of *Hylaeus* (Snelling 1966) to include the subgenus *Spatulariella* Popov, which was unknown in the New World prior to his discovery of adventive *H. (S.) punctatus* in California. Both sexes of *H. hyalinatus* possess a lamelliform carina between the anterior and lateral faces of the mesepisternum (termed a lamelliform omaulus by Michener 2000), which Snell-

ing (1983) suggests is “perhaps the best recognition characteristic by which to differentiate *Spatulariella* from the native Nearctic groups.” In addition, males of *H. hyalinatus*, in common with other *Spatulariella*, and unlike all native Nearctic species, possess a spatulate eighth sternum that protrudes conspicuously from the genital opening in combination with long slender gonostyli that extend far beyond the apices of the penis valves (see Fig. 1; and Snelling 1983: Fig. 3). Dathe (1980) discusses *Spatulariella* taxonomy and provides illustrations and keys for European species.

*Hylaeus hyalinatus* can be separated from *H. punctatus* using the key provided below. Male *H. hyalinatus* with black scapes are superficially similar in facial markings to *H. (Prosopis) modestus*, the most abundant native *Hylaeus* in the Ithaca area (see figure of *H. modestus* in Mitchell 1960: Fig. 11). In *H. hyalinatus*, the ventral surface of the flagellum is paler, the face marks are whitish-yellow rather than bright yellow, the supraclypeal mark does not extend above the level of the ventral margin of the antennal sockets, and the scape is often maculated (Fig. 2). *Hylaeus hyalinatus* females have patterns of maculation resembling several other *Hylaeus* occurring in Eastern North America, especially the adventive *H. bisinuatus* Förster, but are readily distinguished by the lamelliform carina of the mesepisternum.

KEY TO THE SPECIES OF *HYLAEUS*  
(*SPATULARIELLA*) RECORDED AS ADVENTIVE  
IN THE NEW WORLD

- 1. Male ..... 2
- Female ..... 3
- 2. Eighth metasomal sternum (S8) with distal spatulate process connected to the base by an extremely narrow elongate stalk (Fig. 1; Dathe 1980: Fig. 107D). Supraclypeal area pale; pale lateral face marks extending on the eye margin to well above the antennal bases (Fig. 2; Dathe 1980: Fig. 107B) ..... *hyalinatus*
- S8 with distal spatulate process broadly connected to the base (Dathe 1980: Fig. 112D; Snelling 1983: Fig. 5). Supraclypeal area usually black; lateral face marks extending little,



Figs. 1–2. *Hylaeus hyalinatus*, male. 1, Apex of metasoma, ventral view; note protruding, spatulate apical process of S8 and elongate, slender gonostyli. 2, Face.

if at all, above the level of the epistomal sulcus (Dathe 1980: Fig. 112B; Snelling 1983: Fig. 2)

- ..... *punctatus*  
 3. Mesopleuron and scutum equally finely punctate. Propodeum with posterior and lateral faces separated by a rounded angle . . . . . *hyalinatus*  
 – Mesopleuron more coarsely punctate than scutum. Propodeum with posterior and lateral faces separated by an irregular carina . . . *punctatus*

New York specimens and European specimens (Dathe 1980) of both male and female *H. hyalinatus* vary in the extent of yellow markings as is also true of other *Hylaeus* species, including *H. punctatus* (Snelling 1983). As in *H. punctatus*, some female *H. hyalinatus* possess a median, preapical clypeal spot whereas others have an entirely black clypeus. Most female *H. hyalinatus* have well developed lateral face marks as illustrated in Dathe (1980), but one female examined had the lateral face marks reduced to about half their usual size. In 11 of 24 New York males examined, the scape was entirely black, whereas in 13 other males the scape was marked to some degree with yellow (Fig. 2). In 6 of the specimens, the scape mark consisted of a stripe extending almost its entire length, whereas in the others the mark was less extensive or almost absent. All 11 males collected on or before July 7 lacked pale scape marks,

whereas all but one male collected after July 22 had scape marks, suggesting that the variable expression of pale markings in *Hylaeus hyalinatus* may be correlated with environmental conditions and may not reflect genetic variability.

*Hylaeus hyalinatus*, widely distributed and abundant in north and central Europe, occurs as far north as Finland (Elfving 1951), and ranges from the Pyrenees in the west to the Caucasus and Moscow in the east and to Greece in the south (Dathe 1980). It inhabits the Alps up to an elevation of 1800 m (Beaumont 1958). Two montane subspecies with restricted ranges are recognized by Dathe (1980) in addition to the widespread nominate form.

In North America, *H. hyalinatus* is known only from the vicinity of the Cornell University campus in Ithaca, Tompkins County, New York. The first specimen, a male, was collected 10 June 1997 on the Cornell campus in the Minns Horticulture Garden (MG), a small plot filled with cultivated flowers of diverse species. The garden is adjacent to a greenhouse conservatory containing exotic plants. Females were first noted at MG on 7 July, and by August both sexes were consistently present in numbers at this location. During 1998–2000



MG remained the center of abundance for the species, but a few specimens were found at other localities within 2.5 km of MG. No specimens were collected further afield, even though I collected dozens of individuals of 7 species of *Hylaeus* from many localities. No additional specimens could be found among the unsorted *Hylaeus* in the CUIC.

*Hylaeus hyalinatus* appears to be widely polylectic in Europe, and females are known to forage on flowers of at least seven families (Westrich 1990). In the Minns Garden, both males and females have been observed visiting plants introduced from the Palearctic region including *Lavandula angustifolia* Mill. [Lamiaceae], *Rudbeckia fulgida* Ait. [Asteraceae], *Brunnera macrophylla* (Adams) I. M. Johnston. [Boraginaceae], *Alyssum* sp. [Brassicaceae], *Anethum graveolens* L. [Apiaceae], and *Foeniculum vulgare* Mill. [Apiaceae]. They were found most frequently, and in the largest numbers, on *Foeniculum vulgare* and *Alyssum*. *Foeniculum vulgare* was the preferred host of *H. punctatus* in California (Snelling 1983), whereas *Alyssum* was one of two plants preferred by introduced *Hylaeus punctatus* in Chile. The only genus of native plant from which *H. hyalinatus* has been recorded in New York is *Solidago* (Asteraceae). This is the most widespread and abundant nectar source in Ithaca during late summer and early autumn, and is commonly visited by several *Hylaeus* species.

Westrich (1990) stated that *H. hyalinatus* is at least partly bivoltine in Germany with a long flight season extending from early May into early October. The Ithaca population is almost certain to be at least partly bivoltine as well, because specimens have been collected from spring into early autumn. Males have been collected from 3 May until 31 August; females from 20 May until 20 September.

In Europe, *H. hyalinatus* nests in preformed cavities in a wide range of substrates. It inhabits banks of sand, gravel, and loam, dry walls, and house walls up to

16 m above ground level. It also uses hollow stems of *Rubus*, and reuses abandoned nests of mason bees and *Trypoxylon* (Westrich 1990). It occurs at the edge of forests, as well as in vineyards, orchards, ruderal areas, and the vicinity of human habitation (Westrich 1990). Given *H. hyalinatus*' behavior and geographic range, its establishment in New York is not surprising.

*Hylaeus hyalinatus* is the third *Hylaeus* species to be reported as adventive in the Americas. *Hylaeus (Hylaeus) bisinuatus* Förster, native to the Palearctic, was first recorded in Fargo, North Dakota, (as *H. stevensi* Crawford) around 1912 and is now widespread over much of North America (Hurd 1979). It has also been introduced to the Hawaiian Islands (Hurd 1979), as has the Australian species *Hylaeus albonitens* (Cockerell) (Hopper and Daly 1995). *Hylaeus bisinuatus* is one of eleven *Hylaeus* species (including *H. hyalinatus*) known from Tompkins County, New York. Of the nine native species in Tompkins County, two, *Hylaeus (Paraprosopis) georgicus* (Cockerell), and *H. (Cephalylaeus) basalis* (Smith), are rare and known from only one, and three specimens respectively, and a third, *H. (Hylaeus) saniculae* (Robertson), has not been collected locally since 1937. Of the remainder, *Hylaeus (Prosopis) modestus* Say is the most commonly collected, while *H. (Prosopis) affinis* (Smith), *H. (Hylaeus) mesillae* (Cockerell), *H. (H.) ellipticus* (Kirby), *H. (H.) verticalis* (Cresson), and *H. (Prosopis) illinoisensis* (Robertson) occur in declining order of abundance. If *H. hyalinatus* expands in range and increases in abundance, it may compete with these as well as other cavity-nesting Hymenoptera for nest sites (Thorpe 1996, Barthell et al. 1998, Cane, in press).

#### *Hylaeus (Spatulariella) punctatus* (Brullé)

This species was first collected in the New World at Playa del Rey, Los Angeles County, California, in 1981 (Snelling 1983). It was later reported from Chile (Toro et al. 1989). In 1999, I collected 29

specimens (1 ♀, 3 ♂ on 2 June, 14 ♀, 1 ♂ on 21 June, visiting flowers of *Aesculus californica* (Spach) Nutt. [Hippocastanaceae] and unidentified Asteraceae and Rosaceae) on the campus of the University of California, Berkeley, Alameda County, California. On 20 June 2000, I collected 13 males in Lafayette, Contra Costa, County, California. These are the first northern California records of *Hylaeus punctatus*. Additional records of this species from Pinnacles National Monument, San Benito County, California in May, 2000 (T. Griswold, in litt.), and from localities in southern California in addition to Playa del Rey (R. Snelling, personal communication), suggest that *H. punctatus* is well-established in California and rather widespread. Voucher specimens have been placed in the CUIC, LACM, and SEM.

*Anthidium (Proanthidium) oblongatum*  
(Illiger)

This species was first detected in North America in Pennsylvania, New Jersey, and Maryland in 1994–1997, and was first noted in Tompkins County, New York, in September, 1997 (Hoebeke and Wheeler 1999). Since then it appears to have rapidly increased in abundance in the Ithaca area. During 1998–2000, I observed and collected abundant specimens of *A. oblongatum* at several sites in Tompkins County where it was not detected in 1997. Most were visiting *Sedum* or exotic Fabaceae, especially *Lotus corniculatus* L. On these flowers *A. oblongatum* consistently outnumbered native megachilids. They were first seen in June and continued activity until at least October 12, when a single male was captured.

*Megachile (Callomegachile) sculpturalis*  
Smith

The giant resin bee *Megachile sculpturalis*, native to east Asia, was first reported from North America by Mangum and Brooks (1997) who found it to be well-established in North Carolina. Batra (1998)

discussed its biology, and provided additional records from Georgia, Maryland, South Carolina, and Virginia.

New records from New York provide the northernmost records from North America and the first records from New York state. In September, 1997, and September, 1999, single heavily worn males were collected in Ithaca (7 September 1997, along the shore of Beebe Lake, adjacent to the Cornell University Campus, K. Anderson; and 12 September 1999, on the Cornell Plantations, S. Munson). In July, 2000, I discovered a large population of *M. sculpturalis* in Ithaca, Tompkins County, New York at Penny Lane, Commonland Community (17 ♀, 2 ♂, 16 July; 50 ♀, 83 ♂, 21 July–12 August). All females were gathering pollen or nectar from Everlasting Pea, *Lathyrus latifolius* L. [Fabaceae], a large-flowered legume. Most males were visiting *L. latifolius*, but smaller numbers were found on *Melilotus alba* Medikus. [Fabaceae] (14 specimens), *Asclepias syriaca* L. [Asclepiadaceae] (10), *Cirsium vulgare* (Savi) Tenore. [Asteraceae] (2), and *Coronilla varia* L. [Fabaceae] (1). Male *M. sculpturalis* were observed to enter holes made by carpenter bees (*Xylocopa virginica* Linnaeus) in a wooden beam beneath the roof of a carport near the *Lathyrus* patch. These holes presumably contained active nests of *M. sculpturalis*. Another population of *M. sculpturalis* was found at a patch of *Lathyrus latifolia* 13 miles south of Syracuse, Onondaga County, New York (4 ♀, 5 August 2000). Additional records are from the Cornell University Campus (Minns Garden, 4 ♂, 13–14 August 2000, E. R. Hoebeke and JSA, ex *Perovskia artemesioides* [Lamiaceae]) and Staunton, Augusta Co., Virginia (1 ♀, 1 August 2000, M. E. Carter, ex *Verbascum thapsus* L. [Scrophulariaceae]).

DISCUSSION

All of the adventive species mentioned above nest in plant stems or pre-formed cavities, except for *Hoplitis anthocopoides*, which builds mortar-and-pebble nests on

the surfaces of boulders. The habit of building concealed nests above ground in or on portable and sometimes man-made substrates, characteristic of many Hylaeinae, Megachilidae, and Xylocopinae (Apidae), facilitates long-distance transport of nests within plants, wood products, and other items of trade. All but one of the species listed by Cane (in press) as accidentally introduced to North America belong to these three taxa. The exception is *Andrena (Taeniandrena) wilkella* (Kirby), a ground-nesting andrenid probably introduced to northeastern North America from Europe (Malloch 1918) and now abundant throughout eastern North America. *A. wilkella* forages on diverse plants and can therefore be considered as polylectic (Cane, in press), but shows a decided preference for Fabaceae (Westrich 1990). In Ithaca (where it has been present since at least 1904) pollen-collecting females are abundant visitors to exotic Fabaceae, especially *Melilotus alba* Desr., from late-spring to mid-summer. Cane (in press) may be correct to assert that nests of fossorial bees are unlikely to enter the United States from other countries due to regulations restricting the importation of soil. However, ground-nesting bee species have been transported long distances within the United States. The ground-nesting halictid, *Lasioglossum (Dialictus) imitatum*, native to eastern North America, has been reported as adventive in California (Moure and Hurd 1987). In addition, at least two species of *Lasioglossum (Dialictus)* are now present in Hawaii.

More systematic surveys of local bee faunas are needed in order to detect newly adventive species, to monitor the spread of these species, and to assess their impact on the native fauna and flora. Given recent increases in transcontinental trade, particularly with Asia, North American entomologists should expect many more additions to our insect fauna in the near future, not all of them as benign and attractive as *Megachile sculpturalis* and *Hylaeus hyalinatus*.

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## LITERATURE CITED

- Barthell, J. F., G. W. Frankie, and R. W. Thorp. 1998. Invader effects in a community of cavity nesting megachilid bees (Hymenoptera: Megachilidae). *Environmental Entomology* 27: 240–247.
- Batra, S. E. T. 1998. Biology of the Giant Resin Bee, *Megachile sculpturalis* Smith, a conspicuous new immigrant in Maryland. *The Maryland Naturalist* 42: 1–3.
- Beaumont, J. De. 1958. Les Hyménoptères aculéates du Parc National Suisse et des régions limitrophes. *Ergebnisse der wissenschaftlichen Untersuchungen der schweizerischen Nationalparks*, N. F. 6: 145–235.
- Cane, J. H. In press. Exotic non-social bees (Hymenoptera: Apoidea) in North America: ecological implications. In Strickler, K. and J. H. Cane, eds. For non-native crops, whence pollinators of the future? Thomas Say Publications.
- Dathe, H. H. 1980. Die Arten der Gattung *Hylaeus* F. in Europa (Hymenoptera: Apoidea, Colletidae). *Mitteilungen Zoologisches Museum in Berlin* 56: 207–294.
- Eickwort, G. C. 1970. *Hoplitis anthocopoides*, a European mason bee established in New York state (Hymenoptera: Megachilidae). *Psyche* 77: 190–201.
- . 1980. Two European species of *Chelostoma* established in New York state (Hymenoptera: Megachilidae). *Psyche* 87: 315–323.
- Elfving, R. 1951. Die Gattung *Prosopis* Fabr. in Finnland. *Notulae Entomologicae* 31: 67–92.
- Hoebeke, E. R. and A. G. Wheeler, Jr. 1999. *Anthidium oblongatum* (Illiger): an Old World bee (Hymenoptera: Megachilidae) new to North America, and new North American records for another adventive species, *A. manicatum* (L.). *The University of Kansas Natural History Museum Special Publication* 24: 21–24.



- Hopper, D. and H. V. Daly. 1995. Range extensions of *Hylaeus* (Hymenoptera: Colletidae) on Kauai. Records of the Hawaii Biological Survey 42: 35.
- Hurd, P. D., Jr. 1979. Superfamily Apoidea, pp. 1741–2209. In Krombein, K. V., P. D. Hurd, Jr., D. R. Smith, and B. D. Burks, eds. Catalog of Hymenoptera of America north of Mexico. Volume 2. Smithsonian Institution Press, Washington, D.C.
- Jaycox, E. R. 1967. An adventive *Anthidium* in New York state (Hymenoptera: Megachilidae). Journal of the Kansas Entomological Society 40: 124–126.
- Malloch, J. R. 1918. Occurrence of a European solitary bee (*Andrena wilkella* Kirby) in the Eastern United States. Proceedings of the Biological Society of Washington 31: 61–64.
- Mangum, W. A. and R. W. Brooks. 1997. First records of *Megachile* (*Callomegachile*) *sculpturalis* Smith (Hymenoptera: Megachilidae) in the continental United States. Journal of the Kansas Entomological Society 70: 140–142.
- Michener, C. D. 2000. Bees of the world. The Johns Hopkins University Press, Baltimore and London. 913 pp.
- Mitchell, T. B. 1960. Bees of the eastern United States. Volume 1. North Carolina Agricultural Experiment Station Technical Bulletin Number 141, Raleigh. 538 pp.
- Snelling, R. R. 1966. Studies on North American bees of the genus *Hylaeus* 3. The Nearctic subgenera (Hymenoptera: Colletidae). Bulletin of the Southern California Academy of Sciences 65: 164–175.
- . 1983. Studies on North American bees of the genus *Hylaeus*. 6. an adventive Palearctic species in southern California (Hymenoptera: Colletidae). Bulletin of the Southern California Academy of Sciences 82: 12–16.
- Thorp, R. W. 1996. Resource overlap among native and introduced bees in California, pp. 143–151. In Matheson, A., S. L. Buchmann, C. O'Toole, P. Westrich, and I. H. Williams, eds. The Conservation of Bees. Academic, London.
- Toro, H., Y. Frederick, and A. Henry. 1989. Hylaeinae (Hymenoptera: Colletidae), a new sub-family of bees for the Chilean fauna. Acta Entomologica Chilena 15: 201–204.
- Westrich, P. 1990. Die Wildbienen Baden-Württembergs. Spezieller Teil: Die Gattungen und Arten. Eugen Ulmer GmbH & Co., Stuttgart. pp. 437–972.